



## BOARD OF WATER SUPPLY

Eddie Flores, Jr., Chairman; Charles A. Sted, Vice Chairman; Jan M. L. Y. Amii; Herbert S. K. Kaopua, Sr.; Darolyn H. Lendio; Rodney K. Haraga, Ex-Officio; Larry J. Leopardi, Ex-Officio  
Clifford S. Jamile, Manager and Chief Engineer; Donna F. K. Kiyosaki, Deputy Manager and Chief Engineer

### POWERS, DUTIES AND FUNCTIONS

The Board of Water Supply (BWS) manages Oahu's municipal water resources and distribution system. This City and County Department provides residents with safe and dependable drinking water service at reasonable cost. Revenue collected from water sales finance the Department's operations and projects.

A seven-member Board of Directors presides over the semi-autonomous agency and establishes its policies. Five members are nominated by the Mayor and approved by City Council. The remaining two serve in their capacities as the Director of the State Department of Transportation and the Chief Engineer of the City Department of Facility Maintenance.

The Board appoints the BWS Manager and Chief Engineer to supervise the agency's overall operations and the Deputy Manager's office. The Board-appointed Deputy Manager oversees the day-to-day functions and the Department's six Operating Units – Business Development, Business Services, Customer Care, Maintenance, Operations and Water Resources.

### HIGHLIGHTS

The BWS maintains Oahu's groundwater resources and distribution system to meet the needs of current and future customers, despite mounting restrictions such as increasingly stricter state and federal drinking water regulations and the community's growing demand for water.

During Fiscal Year (FY) 2003, the BWS responded to 337 main breaks, a 19 percent decrease over the average of the last ten years. This decrease can be attributed to BWS' main replacement program, which identifies and replaces older mains with high rupture incidence.

Adopting a more holistic approach to water supply management – that good water stewardship starts with source protection – the Department began to actively pursue alliances with community groups and large Oahu landowners to protect and preserve the island's watersheds. These partnerships involve watersheds in Punaluu, Heeia, Ala Wai, West Honolulu, Makaha and Waianae.

Considerable resources were dedicated to the

implementation of the new Financial Accounting system for the BWS. NALU, as the program is known, is an acronym for Networked Automated Ledger for Utilities. Besides lending some employees to a full-time core team, the Department also set up a Change Advocacy team involving employees from throughout the BWS who communicated to employees the progress of the project and the changes to current financial procedures that NALU will bring.

As part of its business initiative to market professional expertise in daily water utility operations to countries throughout Asia and the Pacific, the BWS sponsored a series of water quality and leak detection workshops for local and South Pacific water agencies in September. The BWS also signed a memorandum of agreement with the Local Water Utilities Administration (LWUA) in the Philippines in November. This significant, historical government-to-government agreement provides LWUA with BWS assistance in water supply management, operations and maintenance to more than 580 provincial water systems serving over 20 million people outside of metropolitan Manila.

### **In November, the BWS entered into a historic international partnership with the Philippines.**

A new office building, located at the Manana Corporation Yard, was completed early in the fiscal year. Administrative staff from the Suburban Field Services and the Automotive section, as well as construction inspectors who are assigned to the area, moved into the building in October.

When the War on Iraq broke out in March 2003, the Department further tightened security measures in BWS' daily operations that were initially imposed in September 2001. New signage warning of unlawful entry to secured BWS sites, a security officer posted at the gate to the Engineering Building Courtyard, and round-the-clock Honolulu Police Department patrols at critical sites were some of the increased safety proceedings immediately put into effect.

In switching over to a new Internet Protocol (IP) phone system in June, the BWS had to notify

its 150,000-plus customers about the phone number change that also resulted. An intensive public education campaign was mounted to include print advertising, water bill announcements and direct mailers with magnets featuring the new BWS phone number.

The Department recognized the accomplishments of several employees this year.

In November, water service investigator III Herbert Imamura and data processing systems analyst IV Sandra Moriki were honored with other City Department Employees of the Year.

Both have an intense commitment to the BWS and are admired for their strong work ethic and can-do attitude that prompts them to seek increasingly better ways to do their jobs. They also share an intense eagerness for learning new things and imparting that knowledge to others. Both Imamura and Moriki are considered experts in their fields.

Herbert Imamura started as a pipefitter apprentice in August 1978. He became a water service investigator in 1981.

Throughout his BWS career, Imamura has sought information and tools to improve work capabilities and conditions, always striving for enhanced customer service.

It was this drive that led him to join the Large Meter Program and learn all he could about the latest developments and technologies available, both on the job and at workshops and conferences. He often paid his own fees and expenses to attend many of these educational events. Working with other leaders in the field to learn skills so that he can improve the Large Meter Program, he is now considered a BWS authority and trainer, often serving as a Departmental spokesman on the subject.

A member of the Customer Care operating unit, Imamura works with large meter customers to improve their water use and conservation measures. Applying his computer training, Imamura has taken raw data and converted it into more understandable tables, charts and reports. He created an Excel document to show consumption and associated costs that employees and customers find useful.

An active American Water Works Association member, he uses his professional contacts to acquire information to address long-existing problems. For example, he met with the Denver Water Department to evaluate their leak detection program and to benchmark BWS' program.

He can be counted on to be there when needed.

He is a conscientious worker whose positive attitude has contributed greatly to better customer interactions for the Department.

When Sandra Moriki joined the BWS in 1980 as a computer programmer III, her supervisors at that time noticed her strong potential for growth.

Over the years, as she rose through the ranks to her present position, she has accepted and completed increased levels of responsibility in designing and implementing computer programs and applications. Currently, she oversees the daily operations of the Applications Section of the Information Technology Branch in the Business Services Operating Unit.

Moriki's positive and enthusiastic attitude, coupled with her integrity and attention to detail, has resulted in her becoming a leader and an agent of change. Others can count on her to assist them where needed; she doesn't mind carrying an extra share of the workload.

Despite taking on many complex and involved tasks, Moriki still produces excellent quality results. Her work has earned her many accolades from colleagues and supervisors.

She promotes continual professional growth among her staff, working to ensure they receive the training needed to do their jobs well. She prepares for the future by grooming up-and-coming project managers to oversee important Information Technology endeavors. She, herself, completed the State Leadership Certification Program that trains tomorrow's managers.

Currently, she serves as project manager for NALU (the BWS financial accounting system).

Moriki, a working mother with four children, devotes herself to the well being of her family.

Both employees represented the BWS in the City's annual search for its outstanding employee and were given the chance to attend the American Water Works Association (AWWA) national conference in Louisville, Kentucky, in June.

#### **BUSINESS DEVELOPMENT**

The Business Development Unit researches and pursues opportunities to expand and market the Department's water utility business.

In FY 2003, the water reclamation facility delivered an average of 6.5 million gallons of recycled water per day to various Ewa and Campbell Industrial Park users.

The Department also continued its strategic initiative to expand its services area by submit-

ting proposals to own and operate the Army water and Navy water and wastewater systems on Oahu. These actions are a direct response to Department of Defense initiatives to privatize military water and wastewater systems nationwide. In addition, the Department continued efforts to market technical assistance in the Asia Pacific region focusing on Pohnpei, the Philippines and Saipan. These types of projects are part of the Department's vision to increase its presence and to build lasting business relationships in the region.

### **BUSINESS SERVICES**

The Business Services Operating Unit meets the administrative support and information needs of the Board of Water Supply. It provides financial information and analysis, information management tools and services, payroll and human resources functions, risk management and other administrative support.

This unit is responsible for all financial and accounting activities, including fiscal analysis and accounting systems development, management accounting, and budgetary accounting and control.

The Finance Section has primary responsibility for the implementation of the Networked Automated Ledger for Utilities (NALU) system. An integrated group of software applications, NALU replaces the current outdated, primarily manual, separate financial information subsystems of the BWS.

NALU is an Enterprise Resource Program (ERP) that includes applications for general ledger, human resources, job costing, accounts payable, payroll, purchasing, budget monitoring, fixed assets, and inventory management. It affects all operating units of the BWS and required re-engineering work processes throughout the Board.

It also required reorganizing the Finance Section and the Business Services Unit to perform the new processes and to optimize the increased capabilities of the system. Two new sections created by the reorganization are the Treasury and Purchasing sections. These changes are being made in conjunction with the implementation of NALU that has an anticipated go-live date of November 3, 2003.

During the year, Finance Section personnel selected a software package from J.D. Edwards. A full-time, dedicated core team of financial personnel worked with IBM consultants in designing,

configuring and implementing this NALU package.

This year, Finance Section personnel also implemented a Purchasing Card procurement subsystem (P-Card) that substantially reduces the time and effort required to procure high volumes of relatively low-value items. Procedures for this group of procurements were extremely labor-intensive, particularly in the areas of purchase requisition and related accounts payable processing.

In addition, the Finance Section also participated in the implementation of an automated time and attendance system, Kronos, that replaced the Board's outdated, labor-intensive timekeeping and leave reporting systems. Kronos provides accurate time records essential to an efficiently functioning payroll system, and reduces time spent completing paper-based timesheets and leave applications, entering data from these documents, and reconciling time and leave records.

Benefits include providing timely, accurate information to managers to facilitate their management of employees and workloads; and enabling BWS personnel to access their respective leave balances and perform self-service tasks that presently require involvement of payroll or human resources personnel.

The Finance Section developed and obtained Board approval of the FY 2003-04 operating budget, which provides \$94 million for operating expenditures; \$66 million for pipeline repair and replacement, pumping station renovation, business process improvements and business development. The Board also approved a Capital Improvement Program (CIP) budget of approximately \$36 million, primarily for construction of new water system facilities.

The Board completed a rate study in Spring 2003 to ensure the adequacy of the amounts being charged and collected for water services. BWS has not implemented an increase in its rates and charges since July 1, 1995.

The Information Technology Section (IT) provides complete computer, phone and network-related services to the Department. Last year, the Section:

- Replaced the Board's aging telephone system with a new Internet Protocol (IP) based phone system, including a Unified Messaging System that allows users to access voice mail messages from Microsoft Outlook. Also installed a Call

Center System that can play recorded messages, allow users to service select options and automatically route and log calls. Implementation was completed on schedule and on budget.

- Implemented Kronos, an automated Time and Attendance system to replace manual time sheets. Project included over 700 pay rules and procedures covering multiple unions and bargaining units. The rollout of the system is now complete, with over 600 BWS employees entering or having their time entered into the new system. There is also an interface from Kronos that feeds Payroll in our new NALU accounting system.
- Continued to provide billing and customer information services for the BWS to the Department of Environmental Services (wastewater); Board of Water Supply, County of Maui; and the Department of Water, County of Kauai.
- Currently implementing the Networked Automated Ledger for Utilities (NALU) system, the new J.D. Edwards financial package. Working with a core team of financial personnel and IBM implementation consultants, the Applications staff has written conversion programs, configured software, set up and administered domains, databases, and work rules, written special reports, etc. Project is expected to go live on November 3, 2003.
- Completed development of the Honolulu ONLINE Utilities (HONU) system, a web site that links asset and customer information, and makes it available to BWS clients on a map. This web site won a Special Achievement in Geographic Information System(GIS) Award (SAG) from Environmental Systems Research Institute(ESRI), an award given annually to sites around the world in recognition of their outstanding leadership in the field of GIS, and was highlighted as the cover story in the May 2003 issue of Public Works Magazine.
- Generated and distributed the Request for Proposal (RFP) for the new Computerized Maintenance Management System (CMMS). Evaluated the proposals, went through selection process and procured MAXIMO as our vendor of choice. IT will be managing this new project as it kicks off and proceeds through implementation.
- Completed 16 major projects in support of other

units, including an upgrade of our network and servers, preparing for disaster recovery, rolling out new applications for Large Meter and Water Sampling crews, instituting bar code and handheld GPS technology in the field, and implementing check writing software and hardware.

- The IT group continues to support its client units, assisting them in all projects with technical components, procuring and installing new PCs and hardware, and providing consulting services wherever needed.

The Board of Water Supply **Human Resources (HR) Office** is responsible for administering and managing the human resources program for 555 regular, full-time employees.

With a staff of four permanent employees, the BWS HR Office develops, formulates and implements BWS and City and County Human Resources policies and procedures, as appropriate; administers and provides guidance to the operating units on labor relations issues and concerns covering five collective bargaining units; recommends appropriate human resource actions and ensures proper transactions of such; serves as responsible office in maintaining and controlling the official personnel records of BWS employees; establishes positive working relationships with the City and County Department of Human Resources, Unions and other governmental agencies; coordinates training; and provides safety/driver improvement programs along with certification for Commercial Driver's Licensure.

During the 2002-2003 fiscal year, the BWS had an average of 556 regular, full-time employees, 21 new employees were hired, while 22 retired and 25 resigned. At the end of the year, there was a total of 555 regular, full-time employees in the BWS.

Industrial accidents totaled 63 with total lost time cases of 30. Total workers' compensation cases decreased from the same time last year with \$1,226,368 in expenditures increasing by 19%.

The BWS HR Office coordinated the Blood Bank Drives and the American Heart Association's Heart Walk, as part of the overall support of the community and its agencies to assist the citizenry of the State of Hawaii.

Training classes, workshops, conferences and seminars continue to be well attended in areas such as job-related skills and supervision; retirement

and financial planning; drug, violence and sexual harassment awareness.

The Human Resources Office also coordinated the department's programs for the Employees of the Year Recognition and Service Awards. During the fiscal year, seven employees received 25-year service awards and two received 35-year service awards. By year's end, 119 employees had acquired 25 or more years of government service.

The HR Office, through its Driver Improvement Coordinator, continued training to ensure the safe operation of vehicles and to minimize accidents and injuries within the fleet. Six new employees were trained and will be licensed to operate CDL vehicles by mid-October, 2003.

Weekly meetings are in process to cover training and certification of operators and pipefitters who will operate crane and hoist vehicles. Two operators are now in their final phases of certification for the Crane and Hoist License, and 40 pipefitters have gone through the Crane Safety Course with 100% passing the final exam. This will keep the BWS within the requirements of the National Commission of Certificated Crane Operators.

The Drug and Alcohol Training and Awareness program has been successful, as there have not been any positive tests. The training and testing is an ongoing program and must be updated on a regular basis with new information that is obtained through participation at national conferences and courses.

#### **CUSTOMER CARE**

The Customer Care Unit is responsible for handling the majority of the contacts with consumers. The Unit reviews all development construction plans, evaluates master plans and requests for water availability, prepares applications and contracts for water services, reviews and approves building permit applications and reviews construction plans. It also inputs and maintains water service information in the GIS, generates GIS based maps, maintains all service records, designs service connections, collects bills, investigates consumers' service problems, administers water system facilities charges and administers the rules and regulations governing water service to consumers.

The Department added 2,766 services during the year. There are a total of 162,128 active services in the system, which includes 160,184

domestic services and 1,944 fire services.

The **Community Relations Office (CRO)** educates BWS customers about Oahu's water supply through programs that promote personal stewardship of this finite natural resource. CRO also works to ensure positive interaction between the Department, the community and the media regarding BWS activities and operations.

The office serves as the information liaison between the Department and the public. In FY 2003, CRO continued to serve as a primary intake site for phone calls involving community concerns, complaints and inquiries, as well as a variety of BWS activities and programs. In addition, staff provides information about the water resource, the water supply and conservation to both teachers and students, and promotes a better understanding within the classroom about this precious resource.

Community Relations staff issued 19 news releases, prepared four speeches for BWS personnel, gave 46 speeches and composed 401 letters. They distributed well over 200,000 publications, including materials on conservation and the water supply, annual reports and other resource material.

Public outreach is an important component of the office. Community Relations participated in 21 community events, staffing booths and distributing water information; and attended 15 speaking engagements at schools and other venues.

Security issues generated by the start of the War on Iraq in March shut down year-round tours of the Halawa Xeriscape Garden and the Fred Ohrt Water Museum for the remainder of the fiscal year. Prior to closing facilities to the public, CRO conducted 53 group tours to school groups primarily, visiting dignitaries and other VIPs.

To compensate for this void, the Community Relations Office stepped up its speaker's program and increased visits to elementary and middle schools on Oahu. In March, the Nuuanu Reservoir #4 Watershed area was designated as an appropriate site to conduct a facility tour. School groups with students who are grade four and older learn about the importance of the island's watershed areas and their role in taking care of the environment. Between March and June, there were five group tours conducted in Nuuanu.

The 14th Annual Unthirsty Plant Sale in August promoted water-efficient landscaping, offered water-saving plants for purchase and gave out rare, native Hawaiian plant seeds propagated by the Friends of Halawa Xeriscape Garden (FoHXG).

Co-sponsored by the BWS and the FoHXG, the plant sale offered classes on xeriscape, plant craft and propagation and garden tours. A new feature, "Ask the Plant Doctor," was added this year. Proceeds benefit the garden's water education program.

In August, the BWS printed and distributed 8,000 Teacher's Water Conservation Calendars and stickers. Each month displays a winning entry from the 2002 Annual Water Conservation Week Poster Contest with a photo of the student artist and the teacher. Artwork illustrated the theme, "Conservation – Caring for the Future of Our Drinking Water."

The 13th Annual Detect-A-Leak Week program urged water users to check for property leaks from March 2 to 8. Co-sponsored by Sheraton Waikiki Hotel, the Oahu Chapter of the Hawaii Sierra Club, the Chamber of Commerce of Hawaii and Royal Hawaiian Shopping Center, the program generated about 200 mail-in requests for free home leak checks.

The 2003 Water Conservation Week Poster Contest celebrated its 25th anniversary, and drew more than 2,715 entries from 79 public and private school students island-wide in kindergarten through grade six. Its theme was "No Effort is Too Small to Use Water Wisely." Winning and honorable mention entries were displayed at City Hall's Lane Gallery from April 29 to May 23.

CRO continued to administer the Neighborhood Board Liaison program to foster ties to grass roots level of the community. Employees volunteer as BWS representatives for 30-plus Neighborhood Boards, sharing BWS information and bringing back community concerns and inquiries for response.

Water service investigators from the **Investigations Section** handled various assignments including 13,068 of abnormally high water bills. Also, there were a total of 1,511 leaks and 11,861 general jobs, including requests for locating of water mains.

**Customer Service Section** representatives received an average of 4,282 calls each month from customers requesting various services and information.

**Service Engineering Section's** personnel reviewed 8,850 building permits, processed 2,820 water service applications and reviewed 425 construction plans.

The **Collection and Credit Section** visited

19,200 delinquent customers. The Cashiering Unit collected \$117,072,031.96 in water bill payments and \$103,410,407.20 in sewer payments for the year.

The Customer Care Unit has offered Automatic Bill Payment (ABP) Plan to all customers since August 31, 1988. As of June 30, 2003, the BWS has 38,203 customers on ABP, which represents 23.6% of all customers.

The **Plans Review Section** reviews all development construction plans, specifications, and reports for all City, State, Federal and private water system improvements for conformity with BWS standards; performs hydraulic calculations to verify adequacy of fire protection for proposed projects; and prepares and administers agreements and Memorandums of Understanding with public agencies and private developers. It also reviews and processes agreements and bonds for subdivision water system improvements; and coordinates the review of plans with other units within the Department and the City Department of Planning and Permitting.

This year, the Section reviewed and approved various water system improvements for large subdivisions such as developments for Ewa by Gentry, Mililani Mauka, Ocean Pointe and Makakilo subdivisions in the Ewa area; large meter installations for commercial and industrial developments throughout the island; and various road improvements from City, State and private utility companies.

The **Project Review Section** evaluates master plans and requests for water availability, maintains records of water allocations, responds to requests for hydraulic data (flow and pressure), reviews environmental assessments, coordinates departmental reviews of submittals from other public agencies such as the Department of Planning and Permitting (DPP) Subdivision Committee and monitors water allocations from new and future well projects at Maakua, Makaha, Honouliuli, Waipahu III, Mililani Wells IV, Royal Kunia and HECO-Waiiau.

This year, the Section reviewed projects and water master plans for Mililani Mauka, Ocean Pointe, Kakaako and the reclaimed water system in the Ewa Plain.

The **Cross-Connection Control Section** manages and implements the Department's Cross-Connection Control and Backflow Prevention Assembly Testing Program, which involves

over 6,300 backflow prevention assemblies island-wide.

During the past year, the Section processed 904 building permit applications with 101 backflow prevention assemblies that required installation. In addition, multiple field inspections addressed consumer's concerns regarding the BWS' Cross Connection Control and Backflow Prevention Annual Testing requirements. Currently, there are 302 privately owned and government owned backflow prevention assemblies and 97 agricultural assemblies for installation that are to be inspected in the coming year, according to BWS Standards.

The Cross-Connection Control Section's Annual Testing Program has mailed 3,691 first notice test forms and 1,512 second notices. An average of 307 test forms have been mailed out per month for the past fiscal year.

The **Revenue and Customer Account Section** conducts the Department's water billing operations and its related functions, which include meter reading, pre-auditing water billing data and maintaining accounts receivable records. The Section also reviews financial and statistical reports, is responsible for mailing department correspondence and maintains the City Department of Environmental Services' sewer accounts-receivable records.

As of June 30, 2003, a project to convert the residential water meters in the BWS system to electronically-read water meters was completed.

The **Meter Shop** completed 1,032 service reports to verify and repair the automatic reading meters. The meter shop personnel also provided services to obtain follow-up meter readings.

The field crews assigned to the Meter Shop provided maintenance services to 408 large meters (meters larger than two inches). Meter Shop personnel also repaired 491 meters and tested 457 meters associated with the meter contract purchases. The meter shop also started a new meter master program that studies the flow analysis of a given meter and has completed 384 test cases. Using data analysis, the crews replaced 16 meters with more efficient sized meters.

## **MAINTENANCE**

The Maintenance Operating Unit is responsible for ensuring the continued operational integrity of the municipal water system.

**Maintenance Unit-Engineering** ensures that

all improvements to Oahu's municipal water system are designed and constructed in compliance with the Department's Water System Standards. Engineering personnel reviewed plans and specifications and managed water system improvement projects performed for the Department by consultants. Engineers also performed in-house design of plans and specifications for water main replacements and facility repair and renovation projects. BWS inspectors supervised the construction of these projects to ensure that improvements conform to water system standards.

One of the major functions of Maintenance Unit-Engineering is to implement the Department's Capital Improvement Program (CIP) and Research and Facility Improvement Program (RFIP). The CIP includes the design and construction of new production, storage, and treatment facilities and new water mains. The RFIP includes repair, maintenance and upgrade of aging water mains and facilities. Through Engineering, the Department awarded a total of nearly \$82 million in construction contracts and over \$32 million in consultant contracts as of June 30, 2003. The following summarizes projects awarded and construction completed by the Department in the past fiscal year:

- Contracts were awarded to drill monitor wells in Laie and Kahuku and to deepen an existing well at the Kaluanui Well II site. These deep wells monitor the condition of the fresh water lens. The data from these wells will help BWS in the management of our groundwater resources.
- To meet increasing demands on the water system, BWS continues to explore alternative sources of drinking water. Exploratory well drilling projects were awarded in the Kalaeloa area. The Kalaeloa Caprock well will be used to evaluate potential groundwater sources in the area. Also awarded was the Kalaeloa Basalt well project. Upon completion, this well will be used as a production facility for the Kalaeloa Desalination Plant, where salt water from the lower caprock aquifer will be converted into potable water.
- A construction contract was awarded for the installation of a nitrate treatment facility near the Kunia Wells II site. Upon completion, this facility will help ensure that the water from the Kunia Wells II site continues to meet State and

Federal water quality standards.

- A construction contract was awarded for the Honouliuli 228' Reservoir No. 3, a new six million gallon (MG) reservoir, to increase the storage capacity in the leeward water system. Construction is nearing completion on the Makaha 242' Reservoir No. 2, a new two MG reservoir and the Kailua 272' Reservoir, a new four MG reservoir. Situated at strategic locations, these reservoirs will ensure a reliable supply of water and maintain adequate pressures within the water distribution system.
- Aging and corroding water mains are systematically replaced throughout the municipal water system to reduce main breaks, improve system reliability and ensure sufficient pressure during periods of peak demand. Fire hydrants are also installed to provide adequate fire protection. Transmission mains were installed along Kahekili, Kamehameha and Likelike Highways in Kaneohe and Kamehameha Highway and Lumina Street in Waipio. Distribution mains were installed in Ala Moana, Ewa Beach, Makaha, University, Wahiawa, Waialae, Waikiki, Waipahu and Wilhelmina Rise. New water main construction contracts were awarded for transmission main installations in Kalihi, Wahiawa and along Farrington Highway in Makaha and for distribution mains in Aiea, Halawa, Hawaii Kai, Kailua, Kaimuki, Kalihi, Kapahulu, Liliha, Nanakuli, Palolo, Pearl City, St. Louis Heights and Waialae.
- Construction contracts were awarded to renovate the mechanical and/or electrical systems for Ewa Shaft, Kaamilo Wells & Booster, Kalauao Wells, Makakilo Booster No. 1, Makiki Booster, Manana Well and Newtown Wells & Booster. Renovation projects were completed for Aiea Wells & Booster No. 1, Kahuku Wells, Lualualei Line Booster, Makaha Well V, Makaha Well VI, Mililani Wells and Moanalua Well No. 1. These projects ensured the dependable service and operational efficiency of the Department's facilities.
- Maintenance Unit-Engineering continued its program to identify and improve the integrity and appearance of water facilities showing signs of deterioration. Construction contracts were awarded to repair, re-roof, renovate, and/or improve landscaping and irrigation systems at Aina Haina 170' Reservoir, Aina Koa 405'

and 865' Reservoirs, Aliamanu 180' Reservoir, Bella Vista 180' Reservoir, Halawa 277' Reservoir, Kalama 170' Reservoir, Keanu Tunnel, Manoa 405' Reservoir, Newtown 550' Reservoir, Waahila 180' and 450' Reservoirs and Waiiau 850' Reservoir. Projects were recently completed at Halawa 277' Reservoir, Kamiloiki 170' Reservoir, Newtown 550' Reservoir, Waiiau 850' Reservoir and Waihee Line Booster.

The **Maintenance-Field Unit** is responsible for ensuring continuous water service to the Department's 155,000 customers. Unit personnel repair line leaks; install, replace and enlarge water service lines; perform scheduled preventive maintenance of fire hydrants, waterline valves and facility grounds and buildings; and provide 24-hour response to trouble calls and service requests including investigation of leaks, water service closure for repairs and turn-ons.

Other support services provided to the Department include masonry, carpentry and welding work.

There were 337 main breaks the past year, which is significantly lower (19%) than the average number (416 per year) recorded for the preceding ten-year period. Areas recording significantly less breaks were the metropolitan area (-33%), and Waianae area (-35%). Some of the significant breaks the past year:

- Two 12-inch main breaks on Kapiolani Boulevard on September 17, 2002, and June 24, 2003. Half of Kapiolani Boulevard needed to be closed down and traffic contra-flowed during morning and evening peak hours. Extensive road damage caused lane closures and required the calling in of a private contractor to install several thousand square feet of asphalt to make the roadway safe for traffic.
- A contractor installing a utility pole damaged a 16-inch concrete cylinder nonpotable main on Farrington Highway across Honokai Hale. Although repair work was simple, the closure of one lane of that busy section of road caused a minor traffic jam during the evening peak hour.

The Department was once again well represented in the National American Water Works Association(AWWA) Pipe Tapping Contest held in Anaheim, CA. with a men and women's team. The 2001 National Championship women's team made up of employees — pipe person Anna

Tanaka, tappers Carolyn Sawai and Danielle Ornellas and coach Gary Fernandez — attempted to regain their title. Unfortunately, they were unsuccessful in their bid for another championship placing second in the competition with a time of 2:16.65. However, during their preliminary run, the BWS wahine recorded an incredible 1:30.69 time, the lowest time recorded in the women's competition. The Louisville Water Company team from Louisville, KY had the winning time of 2:08.88.

The men's team made up of employees— pipe person Andrew Freitas, tappers Aaron Asato and Everett Arquero and coach James Easley — also did well placing fourth in the finals with a time of 1:30.44. The men's title went to the team from Northwest Oregon with a time of 1:21.15.

The **Distribution Branch**, which consists of three sections, covers the metropolitan Honolulu area from Makapuu Point to Halawa Valley.

**Maintenance Section** crews repaired six main breaks on mountain pipelines and fire hydrant laterals. The welder completed 364 general welding projects.

Valve crews inspected and maintained 11,655 valves and 1,493 air valves, repaired or replaced 348 main valves and 28 air valves and raised 190 manhole frames and covers to street grade.

In conjunction with work done by contractors, the valve crews conducted 75 valve checks and water closure surveys and made three live taps: one 16-inch tap and two six-inch taps.

Hydrant crews inspected and maintained 4,640 hydrants, repainted 4,672 hydrants, repaired 264 hydrants of which 46 were damaged by motorists, plotted three new or relocated hydrants and replaced 37 hydrants in the Metropolitan Honolulu area.

Metropolitan grounds keeping crews continue to provide excellent care to the 102 BWS facilities in the metropolitan area.

**Construction Section** crews repaired 141 main breaks on pipelines four inches and larger in diameter and 1,584 service leaks. The number of both main breaks and service leaks is expected to decline over time as the BWS continues programs to replace old galvanized services and cast iron mains.

Crews renewed 50 galvanized services with copper, cut 57 services at the main, turned on/off 1,559 services, installed 27 bypasses and replaced 877 defective meters.

Masonry crews maintained and repaired BWS facilities, provided masonry support to other field units, made 201 road cuts for service renewals and main break road patches and repaired sections of 319 sidewalks, 79 gutters and 61 driveways.

Carpenters repaired vent screens, booster housing screens, windows, doors and roofs at various sites throughout the island. They also performed other regular duties involving the repair, upgrade and maintenance of BWS facilities and installed shoring in conjunction with main breaks repairs.

Significant pipe repairs by the Construction Section included:

- September 17, 2002, work started at 1:30 a.m. and was completed by 5 a.m. on September 18, 2002. Crews replaced a 12-foot section of pipe to repair a horizontal split on a 12-inch cast iron main at 1139 Kapiolani Blvd. (East Bound) and Grace Pacific Corporation repaired the road.
- June 3, 2003, work started at 8 a.m. and was completed by 2 p.m. on June 4, 2003. Crews plugged a 12-inch main to repair a broken section of the cast iron pipe under the storm drain on the 900 Block Ahua Street & Pukoloa Street and Grace Pacific Corporation repaired the road.
- June 24, 2003, worked started at 5 a.m. and was completed by 6 a.m. June 25, 2003. Crews repaired a horizontal split on a 12-inch cast iron main at 949 Kapiolani Blvd.(East Bound) by replacing a 17-foot section of pipe and Grace Pacific Corporation repaired the road.

**Service and Meters Section** comprises the Service Connections and Building Maintenance Units. Service Connections Unit crews installed 164 new services, repaired 31 service leaks, relocated 44 services, resized 58 services and replaced 321 defective meters.

The crews of the Service Connections Unit also completed 3,356 field service reports to verify and repair leaks, adjust and replace meter boxes, remove dirt and roots from meter boxes and obtain follow-up meter readings.

The Building Maintenance Unit performed custodial and building maintenance services for the Beretania Complex, Kalihi Corporation Yard and Fred Ohrt Museum. The unit's building maintenance repairer fixed various plumbing fixtures island-wide, painted over graffiti in the metropolitan area and made miscellaneous repairs to facilities.

**Suburban Field Services (SFS)** pipefitting crews operating from corporation yards at Manana, Waianae and Wahiawa repaired 119 main breaks, 780 service leaks and one air relief valve; installed 1,656 new services and one meter bypass; renewed 1,530 feet of service mains and 148 old and leaking galvanized services with copper pipe; and placed 257 additional fire hydrants in service.

They also cut off seven abandoned services at the main, relocated 39 services/meters, enlarged 18 services/meters, ordered on/off 261 and turned on/off 1,242 services, raised 63 manhole frames and covers to grade and inspected and maintained 6,692 fire hydrants, 7,510 gate valves and 1,094 air relief valves.

Crews responded to 6,508 trouble calls and followed up on 1,732 meter/meter box and service-related problems (field service reports) and replaced 413 defective meters.

Main breaks decreased by 2.5% and service leaks increased by 2.4%. Installation of new services increased by 7.5%, service renewals increased by 23.3% and replacement of defective meters decreased by 33.9%.

Significant pipe repairs completed by Suburban Field Services (SFS) personnel included:

- Repairing a damaged 16-inch and three 24-inch concrete cylinder mains on Farrington Highway by welding patches. Traffic was adversely affected only for the repair of the 16-inch main. Two of the three 24-inch breaks were off the road and repairs on the remaining one was postponed and done during off-peak traffic hours.
- Repairing a 20-inch concrete cylinder main on Mailliili Road. It did not adversely affect traffic because of alternate routes and the light volume of traffic on this road.
- Repairing a damaged 24-inch concrete cylinder main on Kalaeloa Boulevard, Campbell Industrial Park, by patching a puncture on the top of the main. The repairs did not adversely affect traffic because the repair work was done on Friday night thru Saturday and the traffic volume is light on this road during the week-end.

Other significant work done by SFS personnel included:

- Relocating staff to the new office building in Manana base yard.
- Performing survey and clearing overgrowth to locate waterlines and appurtenances of the State

Waimano water system in preparation for takeover of the water system.

- Performing survey and familiarization inspections with U.S. Navy Public Utilities Commission personnel for takeover of the Barbers Point water system.
- Making inspections and performing corrective work including clearing of overgrowth, trimming trees and correcting other deficiencies noted in preparation for, and as a result of, Department of Health Sanitary Surveys.
- Correcting automatic meter reading (AMR) deficiencies, installing hardware to convert meters to AMR, installing AMR meters and hardware not done by the contractor and repairing meter and service lateral leaks related to the AMR program.
- Providing potable water supply for City-sponsored community events such as soccer tournaments, Sunset on the Beach in Haleiwa and Sunset on the Plains in Kapolei.
- Continuing to maintain the 120 BWS facilities in the SFS area and performing the following additional work:
  - Clearing overgrowth from facility access roads with recently purchased hedge verge brush clearing equipment, instead of expending funds to contract this type of work.
  - Clearing overgrowth from Makaha 875' Reservoir drainage ditch and Waimano waterlines.
  - Clearing overgrowth and installing rock mulch at recycled water valve clusters in Kalaeloa.
  - Clearing overgrowth and debris, installing an irrigation system and planting grass in HECO easement over a portion of our Waiiau 285 Reservoir site.
  - Removing grass and installing rock mulch in portions of our Waianae base yard.
  - Painting over graffiti expeditiously to minimize its effect at various facilities.
  - Repairing damages and replacing landscaping caused by main breaks.

**Windward Section** crews repaired 70 main breaks on pipelines four inches and larger in diameter and 34 service lateral leaks, as compared to 62 main breaks and 41 lateral leaks last year. Main breaks were 25 percent higher than the past 10-year moving average while lateral leaks were

72 percent lower. The Windward district normally has about 56 main breaks and 122 service lateral leaks per year.

The section continued work on its service renewal program and replaced seven galvanized laterals with corrosion-resistant copper pipe. Pipe crews also enlarged 31 copper services, installed 51 new services, replaced 92 malfunctioning meters and responded to 910 trouble calls and 389 meter-related field service reports.

Valve and hydrant maintenance crews met or exceeded their goals servicing 3,601 valves and 2,979 hydrants to ensure the reliability of the system for isolating mains during emergencies and fire fighting capability.

Grounds crews kept pace with the work in the Windward area and maintained all facilities as scheduled.

## **OPERATIONS**

The **Operations Unit** continues to support the Department's mission to provide its customers with a safe and reliable water supply that is reasonably priced. The Unit monitored and efficiently operated its diverse water system, pumping an average of 148.345 million gallons of water daily.

The Operations Unit is composed of the Plant Operations Division, Water Quality Section, Automotive Division and the Mechanical/Electrical Engineering Section.

The **Plant Operations Division** consists of the Pumps and Telecommunications Section. These two sections operate and maintain all of the department's pumping and treatment plants, including its telemetry and communication systems.

The **Pumps Section** continues to emphasize its preventive maintenance and equipment replacement programs. Highlights of these programs included the servicing and inspection of 28 motor control centers, rewinding four motors and reconditioning five motors of various types and horsepower. The section also overhauled seven horizontal centrifugal pumps and two altitude valves.

**Pumps Section** is continuing its pilot program to replace the more conventional electro-mechanical devices with state-of-the-art equipment. Highlights for this fiscal year included the conversion of the more complex motor control circuit of a deep well pumping unit to a programmable logic controller (PLC). In addition, four gas chlorinators were converted to sodium hypochlorite

systems.

The **Telecommunications Section** continued efforts to maintain the telemetry system in support of the Supervisory Control and Data Acquisition (SCADA) system, as well as the Board's mobile radio system. This section is progressing with its responsibility to install security cameras at more BWS facilities.

The **Water Quality Section** consists of the Chemical and Microbiological Laboratories. Both laboratories continue to maintain their State Department of Health and EPA certifications. They routinely monitor sources, reservoirs and points in the distribution system to ensure that the Department's drinking water meets Federal and State regulations. The Section also monitors regulatory changes and provides consultative services to the Department on environmental and health issues related to water quality.

The Chemical Laboratory analyzed 3,665 samples requiring 9,996 tests during the fiscal year. This included responding to 265 water quality complaints and analyzing 115 seepage investigation samples. Special projects during the past fiscal year included completing radionuclide sampling for all sources and starting another cycle of the lead/copper survey, including contract services with American Samoa to provide their lead/copper survey needs.

During the fiscal year, BWS microbiologists examined 9,233 water samples for coliform bacteria. Of this total, 6,621 were for regulatory compliance, 1,359 were for new main disinfection, 88 were in response to water quality complaints and 1,165 were special investigation and project samples.

The **Automotive Division** administers and operates the fleet management function for the Department. It is responsible for the procurement, maintenance, repair, replacement and disposition of all BWS vehicles and equipment.

During the fiscal year, the Division provided maintenance and repair services for a fleet of 317 motor vehicles, 69 field construction equipment and 32 trailers at its repair facility in Pearl City. In addition, plans and specifications were prepared for the procurement of 19 new vehicles of various types, a new backhoe/loader and a new flatbed trailer.

Numerous technical training sessions were coordinated through various equipment manufacturers, industry professionals and govern-

ment inspectors to keep abreast with advancements in the automotive industry, and to develop the repair staff's skills and knowledge. These sessions provided methods to maximize vehicle and equipment longevity and ensure safe operation.

In May of the fiscal year, the Division implemented an automated fueling management system. This fueling system provides fueling availability 24 hours a day, seven days a week, at our Kalihi Corporation Yard and Beretania Complex facilities. Fueling data is now interfaced with the overall fleet management system to track fueling history, performance and inventory.

The Automotive staff completed its second year working with the computerized fleet management system. Increased usage of the system has assisted staff in researching fleet repair histories, warranties and inventories on-line. Complemented with the recent integration of the automated fueling system, much of the office operations have been streamlined.

The **Mechanical/Electrical Engineering Section** administers the Department's RFIP and CIP projects whose major scope of work involves mechanical or electrical work or equipment. The section also supports the Maintenance Unit engineering design sections when their projects involve mechanical or electrical work. They ensure that new facilities are designed, constructed and tested to comply with the department's standards.

Construction projects that were completed this fiscal year include Maunawili 500' Reservoir Control Valve, Nanakuli Booster Renovation, Waipahu Wells I GAC: Replace Backwash System and Flowmeters, Lualualei Line Booster Renovation, Makaha Well I Renovation, Kahuku Wells: Replace Pumping Units, Puanani Wells: Repair Pump No. 6, Kaamilo Wells: Repair Pump No. 1, Makaha Well II Pump Repair, Mililani Wells I: Replace Valves and Flowmeters, Makaha Well VI Repair and Haiku PRV Replacement. Construction contracts awarded were Makakilo Booster No. 1: Replacement of Pump No. 3, Makiki Booster Renovation and Luluku Well: Pump Replacement.

The Operations Unit continues to support the Board's re-engineering program. During the year, Operations worked with the Business Services Unit to successfully pilot the P-Card and Time-and-Attendance programs, greatly streamlining the work process and paperwork. These programs are now ready to be implemented in other operating units.

## WATER RESOURCES

The Water Resources Operating Unit conducts the planning and outreach needed to provide current and future customers with high quality service at reasonable costs, while protecting the long-term viability of Oahu's water resources and enhancing the environment.

The **Water Systems Planning Section** is responsible for the following tasks: (1) Developing and maintaining computer hydraulic models of the various water systems; (2) Updating the water use zone codes and maps, which provide geographical consumption data for use by various Operating Units; (3) Reviewing and evaluating hydraulic calculations and assumptions for various planning studies; (4) Evaluating the hydraulic feasibility and extent of water system facilities improvements proposed in the department's Research and Facilities Improvement Program (RFIP) and Capital Improvement Program (CIP); (5) Collecting real-time water system operational data (flow rate, pressure, etc.) from the field not only for the development and calibration of the water system hydraulic models, but also to assist the work of other Operating Units; and (6) Periodically updating the Water System Schematics, which depicts the major water system facilities and transmission mains.

During the fiscal year, the section completed the Waiau 850' Reservoir Easement Pipeline Feasibility Study (which identifies feasible alternatives to a cross-country transmission main that provides water service to the Waiau, Newtown and Royal Summit communities) and the first drafts of the district plans for the Honolulu and Windward areas that document the current status of the district water systems and identify, assess and evaluate strategic plans to develop and optimize these systems. It also provided hydraulic evaluations of various RFIP and CIP projects. In addition, the staff completed their primary involvement with the department's Vulnerability Assessment of its infrastructure.

The section also continued to administer the calibration of the computer hydraulic models; conversion of the existing Water Use Zone coding and maps to the new Geographical Consumption coding system; preliminary engineering studies and environmental documents for reservoirs in Diamond Head, Kaneohe, Kalama Valley, Waiawa, Kaluaao and Halawa; acquisition of the Waimano Training School and Hospital water system and

Waiahole Valley water system from the State, the Kalaeloa water system (portions of the water system that served the former Barbers Point Naval Air Station) from the Navy, the Villages of Kapolei Nonpotable water system from the Estate of James Campbell and various other water systems from the Navy and Air Force; the design of rock fall mitigation measures for the Waialae area; updates to the Honolulu and Windward District Plans; assessment of unaccounted for water in the Windward area; optimization of existing departmental water sources; and hydraulic analyses for various RFIP and CIP projects.

In addition to working on the projects mentioned above, Water Systems Planning section staff is participating in the Flexible Human Resources Design Project to assess performance appraisal and compensation issues for the engineering and engineering support disciplines; and serving on the NALU Change Advocacy Team to promote and communicate to Water Resources Operating Unit staff the upcoming significant changes to the department's financial procedures.

The **Long-Range Planning Section** prepares the Department's Six-Year CIP and long range plans for projected water system requirements and coordinates proposed Development Plan Map Amendments with the City Planning Department.

The staff provided testimony for proposed legislation in the areas of water resource management and State land use planning. They also evaluated proposed legislation for revising the State Water Code for impacts to the BWS.

The section worked on Watershed Management Partnerships with public, private, and government entities. The goal of this program is to restore and preserve water resources and the environmental quality of BWS watershed areas through cooperative partnerships.

**The Department actively pursued watershed protection through various partnerships with community groups and large landowners as part of its expanded approach to successful water sustainability.**

Studies worked on during the year included: population and water demand projections; Deep Ocean Water Application Facility; Waialua-Mokuleia-Kawailoa Water Development and Transmission Feasibility Study; Waianae 242' Reservoir No. 2 Preliminary Engineering Study and EIS; various CIP project feasibility and water

availability studies; and Ewa district nonpotable water planning.

Population and water demand projections were analyzed for future CIP facilities development requirements to coincide with the 2000 Federal Census, State DBEDT M-K projections, and the City Planning Department's projected distribution of population up to the year 2025.

A feasibility study is being done for a proposed Deep Ocean Water Facility (DOWAF) to assess a preferred site location and mix of products. The DOWAF will use cold deep ocean water for high technology processes such as: electricity production with a potable water by-product, chilled water for air conditioning, irrigation and enhanced crop growth for diversified agriculture, and ocean water for aquaculture farming. Locations in Kalaeloa, Waianae, and Metropolitan Honolulu are being assessed.

The ongoing Waialua-Mokuleia-Kawailoa Water Development and Transmission Feasibility Study will assess water availability and source development in the Waialua-Kahuku water district for possible transmission to either Waianae, Ewa or Windward districts. Capital and operating costs will be evaluated for development feasibility compared to groundwater development in Pearl Harbor and Windward districts, desalination, and wastewater reuse costs.

The ongoing Waianae 242' Reservoir No. 2 Preliminary Engineering Study and EIS will select a preferred site for a new four MG reservoir to provide storage capacity to meet BWS system standards for the Waianae district, which has been gradually upgraded since the BWS acquisition of the old Waianae Suburban Water and Plantation systems.

The ongoing Barbers Point 214' Nonpotable Reservoir No. 2 Preliminary Engineering Study and Environmental Impact Statement(EIS) will select a preferred site for a new six MG reservoir to provide storage capacity for the Honouliuli Recycled Water System.

CIP project feasibility studies assessed costs, water system benefits and integration, and development parameters. The studies are used to identify the need and priority for scheduling projects.

Water availability studies assessed surplus water in existing systems for the entire island. Average day and max day demands for each source will be compared with design capacities, permitted use,

sustainable yield and operating capacities.

For conserving groundwater aquifer supply, the unit worked on the Ewa Nonpotable Water Master Plan to develop additional recycled R-1 and RO quality water in Ewa. The master plan will improve current Honouliuli Recycled Water Facility system operations, identify future users and required infrastructure and provide integration with the Ko Olina-West Beach nonpotable system.

Other future recycled water development is being assessed for Waianae, Wahiawa and Windward districts to develop treated wastewater for nonpotable uses.

Since the **Environmental Section** was still an intact group last fiscal year, including cross-connection control staff, its functions can be found in the Customer Care Operations Unit's section's description.

The **Land Section** acquires water rights, land and land interests by purchase, condemnation, lease, easement, executive order, etc. This Section also disposes surplus real property and manages approximately 13,221.284 acres of land under the control of the Department.

During this fiscal year, BWS acquired 2.308 acres from the Trustees under the Will and of the Estate of James Campbell, Deceased, for the Barbers Point Nonpotable Reservoir.

BWS also purchased 1.952 acres, together with .287 acre for easements for access and utility, drainage and flowage purposes, for \$75,000 from the State of Hawaii Department of Hawaiian Home Lands for the Nanakuli 272' Reservoir.

The Section's other transactions include the acquisition of 15 water pipeline and water meter easements and processing of 71 miscellaneous documents.

The **Hydrology-Geology Section** provides technical support involving the development and monitoring of municipal groundwater sources on Oahu. To conduct this support, the section collects, evaluates and interprets data on rainfall, water levels, water quality, geophysical logs and pumpage trends.

Island wide collection of water level data, meter readings and water samples are conducted on a regular schedule from 17 rain gauges, 30 observation wells and piezometers, 28 artesian wells, 10 springs, one stream gauge and three weirs/flumes. Reports for internal agency use, regulatory requirements and those used within the BWS Annual Report and Statistical Summary are pre-

pared under varying schedules. Geophysical logging of 17 wells was conducted for specific conductance profiling.

In addition to compiling and assessing hydrologic data, the section also assists, reviews and comments on a variety of water and environment related correspondence, locates water sources, prepares contract and well specifications, handles various regulatory well and groundwater use applications, conducts hydrologic studies and furnishes resource information and advice to intradepartmental units, private individuals, organizations and agencies.

Section staff carried out the project management of BWS research and production well construction. Two deep monitor wells were completed (Helemano and Jonathan Spring) with work continuing on Kahuku and Kaluanui III wells. The preparation of contract documents and construction for upcoming projects is ongoing.

Transfer of responsibility among the section staff for managing the BWS radiation safety program under Nuclear Regulatory Agency (NRC) auspices was carried out smoothly. Section staff oversees the radiation protection program of its well logging operations in compliance with those NRC regulations.

The section staff also:

- Assisted the United States Geological Survey (USGS) in the synoptic wellhead survey of wells in the Pearl Harbor area in October and May as well as the coordination of the installation of a USGS rain gauge in Palolo Valley.
- Participated in the Pearl Harbor Monitoring Working Group to assist the State Commission on Water Resource Management (CWRM) in determining groundwater use and permitting triggers for the Pearl Harbor aquifer.
- Participated in watershed partnership programs, such as the Koolau Mountains Watershed Partnership and the Mohala I Ka Wai group (Waianae and Makaha watersheds).
- Planned technology upgrading of all BWS rain gauges to digital tipping bucket types with event loggers; it will be implemented within the next fiscal year. Two remote data acquisition systems were purchased and will also be installed in the coming fiscal year.
- Executed a contract for a three-dimensional model, based on the Feflow code that is currently under development by Todd Engineering.

The applicability of a three-dimension model in simulating Honolulu groundwater conditions is being addressed by this contract. The cooperative study with the USGS on a model describing the effects of alluvial valley deposits on groundwater movement is in progress.

The **Water Conservation Unit** continues to administer the Automatic Meter Reading Project. The Water Conservation Unit coordinates and assists with conservation projects and activities, conducts water conservation and consumption studies and analyses, and researches and investigates water conservation appliances and devices for use in single- and multi-family dwellings and in business and industry.

The Automatic Meter Reading Project Staff is

responsible for the coordination of the installation of automatic meter reading devices. The Board is replacing or retrofitting approximately 150,000 meters so that they no longer have to be manually read. By installing an electronic device on the meter, they data will be transmitted to a computer in a vehicle driving past the meter. The project began in January 2000 and was completed in October 2002. As of June 30, 2003, a total of 147,000 meters have been installed or retrofitted.

The Board of Water Supply, in conjunction with the City, is offering \$100 rebates for the installation of ultra-low flush toilets. The program was approved June 10, 1998 by the Mayor and applies only to residential retrofits. The program has been extended to June 30, 2008.